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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/014,987	12/10/2001	Guanghua Huang	10139.22US01	3373

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EXAMINER	
ROJAS, BERNARD	
ART UNIT	PAPER NUMBER
2832	

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H·A

Office Action Summary	Application No.	Applicant(s)	
	10/014,987	HUANG, GUANGHUA	
	Examiner	Art Unit	
	Bernard Rojas	2832	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18 and 28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yao [US 5,578,976] in view of Hsu et al. [US 6,768,403].

Yao discloses a MEM switch [10] with a cantilever arm [20], a first and second microstrips [18] electrically isolated from each other [figure 1], a contact bridge [22] and means for moving [16, 24] the cantilever arm [20] between a first position wherein the first and second microstrips and a contact bridge form a closed circuit [abs]; and a second position wherein the microstrips form an open circuit [figure 2].

Yao fails to teach that the impedance of the microstrips and the contact bridge are substantially the same.

Hsu et al. discloses a Mem switch [figures 1 and 5] with a first and second microstrips [18, 20] with an impedance of about 50 ohms electrically isolated from each

other and a contact bridge [24] were in the impedance of the microstrips and the contact bridge are substantially the same.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to create the Mem switch of Yao having the contact bridge with substantially the same impedance of the microstrips as shown by Hsu et al. in order to create a smooth signal transition from input across the bridge and to the output by minimizing signal noise [col. 10 lines 16-25].

Claims 1-14 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yao [US 5,578,976] in view of Hsu et al. [US 6,768,403] and in further view of Ruan et al. [US 6,496,612].

Claim 1, Yao teaches an electrostatic MEM switch [10] with a contact bridge [22], a first and second microstrips [18] electrically isolated from each other [figure 1] and a cantilever arm [20] supporting the contact bridge having an end portion, an open state and a closed state, the contact bridge spaced away from the microstrip when the cantilever is in the open state [figure 2] and the contact bridge providing electrical communication between the microstrips in the closed state [abs].

Yao fails to teach that the impedance of the microstrips and the contact bridge are substantially the same.

Hsu et al. discloses a Mem switch [figures 1 and 5] with a first and second microstrips [18, 20] with an impedance of about 50 ohms electrically isolated from each other and a contact bridge [24] were in the impedance of the microstrips and the contact bridge are substantially the same.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to create the Mem switch of Yao having the contact bridge with substantially the same impedance of the microstrips as shown by Hsu et al. in order to create a smooth signal transition from input across the bridge and to the output by minimizing signal noise [col. 10 lines 16-25].

Yao fails to teach that the Mem switch is actuated by means of a coil and that the Mem switch is enclosed in a housing.

Ruan et al. teaches a coil driven Mem switch [100] with an electrically conductive coil [114] opposing the first end of a cantilever arm [112] wherein the coil moves the cantilever arm from the open state to the closed state when a voltage is applied across the coil [col. 5 line 42 – col. 6 line 17] and a housing [504, 510, 512] enclosing the cantilever arm, the first and second contacts and the electrically conductive coil.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the two teachings in order to create an improved Mem switch for high frequency signals. Replacing the electrostatic actuation system of Yao, with the coil driven system of Ruan et al. would provide faster cantilever arm response times. Placing the Mem switch of Yao in a housing as shown by Ruan et al. would protect the Mems switch form debris that could damage the switch.

Yao fails to teach an exact distance between the contact bridge and the microstrips when the MEM switch is in an open state. It would have been an obvious matter of design choice to create a 12um distance as Yao discloses that the distance

between the contact bridge and the microstrips is directly proportional to the amount of energy required to actuate the switch [col. 4 lines 38-48]. Since applicant has not disclosed that this particular distance solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the distance used by Yao.

Claim 2, Yao teaches an electrostatic MEM switch [10] with a cantilever arm [20] having a first and second end portions [figure 2], a contact bridge [22] with an impedance connected to the cantilever arm between the first and second end portions and a first and second microstrips [18] electrically isolated from each other [figure 1] having substantially the same impedance as the contact bridge.

Yao fails to teach that the impedance of the microstrips and the contact bridge are substantially the same.

Hsu et al. discloses a Mem switch [figures 1 and 5] with a first and second microstrips [18, 20] with an impedance of about 50 ohms electrically isolated from each other and a contact bridge [24] were in the impedance of the microstrips and the contact bridge are substantially the same.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to create the Mem switch of Yao having the contact bridge with substantially the same impedance of the microstrips as shown by Hsu et al. in order to create a smooth signal transition from input across the bridge and to the output by minimizing signal noise [col. 10 lines 16-25].

Yao fails to teach that the Mem switch is actuated by means of a coil.

Ruan et al. teaches a coil driven Mem switch [100] with an electrically conductive coil [114] opposing the first end of a cantilever arm [112] wherein the coil moves the cantilever arm from the open state to the closed state when a voltage is applied across the coil [col. 5 line 42 – col. 6 line 17].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the two teachings in order to create an improved Mem switch for high frequency signals. Replacing the electrostatic actuation system of Yao, with the coil driven system of Ruan et al. would provide faster cantilever arm response times.

Claims 3 and 4, Yao discloses the claimed invention except for the exact distance between the contact bridge and the microstrips when the MEM switch is in an open state. It would have been an obvious matter of design choice to create a 12um distance as Yao discloses that the distance between the contact bridge and the microstrips is directly proportional to the amount of energy required to actuate the switch [col. 4 lines 38-48]. Since applicant has not disclosed that this particular distance solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the distance used by Yao.

Claim 5, Ruan et al. teaches using a non-hermitically sealed housing [504, 510, 512] enclosing the entire Mem switch, [cantilever arm, the first and second contacts and the electrically conductive coil]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to place the Mem switch of Yao in a

housing as shown by Ruan et al. in order to protect the Mems switch form debris that could damage the switch.

Claim 6, Ruan et al. discloses that the entire Mem switch is enclosed in a housing [504, 510, 512]. It would have been an obvious to one of ordinary skill in the art at the time the invention was made to create a housing with a depth of about 4mm or less in order to save space and create a compact Mem switch. Since applicant has not disclosed that this size housing solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the housing depth used by Ruan et al.

Claim 7, Ruan et al. discloses that the entire Mem switch is enclosed in a housing [figure 5, 504, 510, 512] having a first lateral side [510] and a second lateral side [512]. Ruan et al. fails to teach the lateral dimensions of the housing. It would have been an obvious to one of ordinary skill in the art at the time the invention was made to create a housing with a lateral dimension of about 4mm or less in order to save space and create a compact Mem switch. Since applicant has not disclosed that this size housing solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the housing depth used by Ruan et al.

Claim 8, Ruan et al. teaches that the housing includes a substrate [102, 104, 106] and a cover [510, 512, 504]. The cantilever arm, microstrips and electrically conductive coils are mounted on a substrate and positioned underneath the cover.

Claim 9, Yao discloses that the microstrips are mounted directly onto the substrate. Yao fails to teach that the substrate is formed from a laminate. It would have

been obvious to one having ordinary skill in the art at the time the invention was made to construct a laminate substrate since the equivalence of a laminate substrate and a monolithic substrate for their use in the Mems construction art is well known. The selection of any of these known equivalents to be used as a substrate would be within the level of ordinary skill in the art.

Claims 10, 11 and 28, Ruan et al. discloses that when the coil is energized, the coil moves the cantilever arm from the open state to the closed state when a voltage is applied across the coil [col. 5 line 42 – col. 6 line 17]. It would have been an obvious matter of design choice to select the voltage/current used to energize the coil depending on the gap between the contact bridge and the microstrips. Since applicant has not disclosed that the use of a particular voltage/current to energize the coil and actuate the cantilever arm solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the voltage/current used by Ruan et al.

Claim 12, Hsu et al. discloses that the first and second microstrips and the contact bridge form a transmission path having an impedance of about 50 ohms when the cantilever is in the claosed state [col. 10 lines 16-25].

Claim 13, Yao discloses that the contact bridge [22] is formed from an electrically conductive material attached to the cantilever arm [20, col. 3 lines 29-35].

Claim 14, Yao discloses the claimed invention with the exception of forming part of the cantilever arm as the contact bridge. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the cantilever arm at

least in part with an electrically conductive material in order to form the contact bridge instead of forming a contact bridge [22] is from an electrically conductive material and attaching it to the cantilever arm in order to reduce the number or parts and simplify assembly of the MEM switch.

Claim 16, Yao in view of Hsu et al. disclose the claimed invention with the exception of using an electrical coil as means to move the cantilever arm.

Ruan et al. teaches a coil driven Mem switch [100] with an electrically conductive coil [114] opposing the first end of a cantilever arm [112] wherein the coil moves the cantilever arm from the open state to the closed state when a voltage is applied across the coil [col. 5 line 42 – col. 6 line 17].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the two teachings in order to create an improved Mem switch for high frequency signals because replacing the electrostatic actuation system of Yao, with the coil driven system of Ruan et al. would provide faster cantilever arm response times.

Claim 17, Ruan et al. discloses the claimed invention except for the use of 25um gauge or smaller wire to create the coil. It would have been an obvious matter of design choice to optimize the gauge of the wire to obtain a desired wire resistance based upon the required magnetic field strength. Since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 18 Yao teaches that the actuation means is positioned by one end of the cantilever arm and that the cantilever then rotates around its second end. Ruan et al. shows 18, the cantilever arm has a first and second end, the coil is positioned adjacent to the first end and the cantilever arm rotates around the second end [figure 1a]. Therefore the combination of the two suggests placing the coil near the first end of the cantilever arm so that the cantilever arm then rotates around its second end.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Rojas whose telephone number is (571) 272-1998. The examiner can normally be reached on M-F 8-4:00), every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin G. Enad can be reached on (571) 272-1990. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Bernard Rojas
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